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Support Apparatus for Pipes in Wall Openings

The invention concerns support apparatus for pipes passing through walls, ceilings or the like, as defined in the preamble of Claim 1.

In a known support apparatus for pipes in a wall opening designed to lead into a house as presented in DE-GM 69 05 321, a liner is inserted into the wall opening to leave a gap between liner and wall, and the pipe is inserted into the liner, likewise leaving a gap between liner and pipe. In order to support the liner within the wall opening, on the one hand, and against the interior pipe, on the other hand, O-rings of elastomeric material are added after insertion coaxially to the longitudinal direction of the pipe, which simultaneously close the wall opening. Any remaining gaps between liner and wall opening are subsequently closed with hardening mortar or a permanently elastic gasket material, such that this support apparatus requiring a coaxial orientation of the wall opening and the interior pipe is costly, and the production costs in total are increased significantly by the many individual components and the required processing labor.

It is the objective of the present invention to provide for a support apparatus for pipes in wall openings of the type described above, which facilitates a sufficiently tight closures of the wall opening even for pipes not central in the wall opening and at reduced cost.

To solve the objective, the support apparatus is characterized by the characteristics listed in the description of Claim 1. Claims 2 to 10 are referenced for other significant embodiments of the support apparatus.

The support apparatus of the invention has at least two movable friction tubes, which have walls designed to permit insertion into each other on site in an axial direction. The corresponding central longitudinal axes, which define the interior and exterior diameter, are offset against each other. The inner of the two movable friction tubes is pushed onto the pipe to be installed in such a manner as to tightly surround it. The second movable friction tube is then pushed over the first in the manner of a pipe-in-pipe connection, and the two components may then be positioned in the wall opening.

After insertion in the wall opening, the two movable friction tubes are then rotated against each other such that their walls, which differ in thickness due to the eccentrically drilled central bore, are pressed against each other in direct contact on the one hand and

such that the outer of the two movable friction tubes will close the gap of the opening in the wall directly. In this manner, the elastic deformation of the two movable friction tubes will close the gap between them as well as close the gap between the outer movable friction tube and the wall opening.

Further details and advantages of the invention derive from the following description and the figures that show one embodiment example of the support apparatus of the invention. The figures show:

Fig. 1 a cross section of two movable friction tubes forming the support apparatus as connected along a line I - I in Fig. 3,

Fig. 2 a cross section of the support apparatus along a line II - II in Fig. 3,

Fig. 3 a cross section of the support apparatus along a line III - III in Fig. 2,

Fig. 4 a cross section of a wall opening in a first embodiment with the support apparatus and a pipe in the installed position,

Fig. 5 a cross section of a wall opening in a second embodiment with the support apparatus outside the wall opening,

Fig. 6 to Fig. 9 each a schematic of the support apparatus with two movable friction tubes in various rotational positions, and

Fig. 10 a schematic of the support apparatus with three movable friction tubes in the installed position similar to Fig. 6.

Fig. 1 shows a closure component, designated as 1 in its entirety, for a support apparatus 2 (Fig. 4), with which a pipe 3 can be installed in a wall or ceiling component 4. Pipe 3 is enclosed on its exterior by closure component 1, and in combination, they also close a wall opening 5 in the installed position (Fig. 4).

The cross section of Fig. 1, in combination with the schematics of Fig. 6 to 9, depict the embodiment of closure component 1 of the invention, which consists of at least two movable friction tubes 9, 10 each with eccentric bores 7, 8, which may be pushed into each other in the direction of the longitudinal axis 11 of pipe 3 for at least a certain distance such that a subsequent rotation of movable friction tubes 9, 19 causes a closure of opening 5.

Movable friction tubes 9, 10 consist completely of an elastic material, such as rubber or the like, in an advantageous embodiment, such that the walls 12, 13 of movable friction tubes 9, 10 are in direct contact with each other, when installed, on the one hand, and otherwise are compressed against the wall of wall opening 5 to close the gap (Fig. 4).

In an advantageous embodiment, the respective inner movable friction tube 9 has several bores 15 through its wall 12 parallel to its axis, such that movable friction tubes 9, 10 (Fig. 4, Fig. 5) are covered by covering plates 16, 17 at each end. This also tightens movable friction tubes 9, 10 by means of connecting screws 18 through bores 15 in a axial direction, such that the closure of wall opening 5 is improved by increased pressure along the walls, in addition to the axial connection and the radial twisting of movable friction tubes 9, 10.

Fig. 4 shows here also that covering plate 16 has an outer diameter D larger than the diameter of wall opening 5, such that covering plate 16 is pressed against wall 4, thus permitting additional pressure, which is adjustable by torqueing connecting screws 18, when movable friction tubes 9, 10 are installed.

In order to improve the contact between movable friction tube 10 and the wall of wall opening 5, a contact surface material 20 may be added to wall 4 in the area of the wall opening. This contact surface material 20 is provided in an advantageous embodiment by a tube 21 that is poured into the opening. This may consist also of an elastic material, such that the closure of wall opening 5 with the outer of the two movable friction tubes 10 is improved.

Fig. 5 shows a second embodiment of support apparatus 2', where the two movable friction tubes 9, 10 are supported by a pipe flange 22 in front of opening 5. The previously described fixation of movable friction tubes 9, 10 in the vicinity of pipe flange 22 is intended for the interior of pipe stub 23, and the closure of opening 5 or 5' is accomplished by a gasket 25 inserted below flange plate 24, which is held in position by several connecting screws 26 used to attach flange pipe 22 to wall 4.

Fig. 6 to 9 show several schematics of the two movable friction tubes 9, 10 in position in a geometrically simplified depiction. This shows the eccentricity that comes into play when movable friction tubes 9, 10 are rotated in position, radiating from a center point M, which corresponds to the center of the wall opening in the area of opening 5. Various alternative positions of the longitudinal axes M1 and M2 relative to the central longitudinal axis M are shown as references for the eccentrically positioned bores 7, 8. This shows clearly that the pipe (not shown) placed in bore 7 may be locked in position to block the flow of liquids and gases, even if it is not placed in the exact center M of opening 5, with appropriate compensation for the off-center position of pipe 3 in opening 5.

Fig. 10 shows a second embodiment of closure 1', with three movable friction tubes 9, 10, and 30, which are attached in the previously described method to close the opening. It is also conceivable to produce movable friction tubes 9, 10, and 30 with conical shapes in their respective walls 12, 13, and 29 in the direction of longitudinal axis 11, such that the previously described insertion of the parts in an axial direction will produce closure in the areas making contact with the respective walls.

If the wall opening is prepared sufficiently precisely, such as by drilling, the off-center insertion of pipe 3 may be closed off in the opening simply by inserting one of the movable friction tubes 9 or 10 or 30 and tightening it by rotation and/or axial pressure (not depicted). It is also conceivable to design the movable friction tubes with one or more longitudinal slits to simplify assembly or to combine the movable friction tubes from several components arrayed behind each other in an axial direction.